Q1)For each of the following series, find out if it is Alternating by rewriting it in one of the forms $\sum(-1)^n b_n$ or $\sum(-1)^{n+1} b_n$ - if possible -. (You may use the other side of this paper).

The series	Alternating? (Y/N)	If Yes, rewrite it in a proper form	What is b_n $(b_n > 0)$
$\sum_{n=1}^{\infty} \sin\left(\frac{(-1)^n}{n}\right)$			
$\sum_{n=0}^{\infty} \frac{\cos(n\pi)}{n^2 + 1}$			
$\sum_{n=0}^{\infty} \frac{(-1)^{2n}}{n!}$			
$\sum_{n=1}^{\infty} \frac{\cos\left(\frac{n\pi}{2}\right)}{\sqrt{n}}$			

Q2) Find the minimum number of terms needed to estimate the sum of the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{(n+1)^2}$ within (0.0009).

Q3) Use the **Comparison test** to find out whether the series $\sum \frac{\log_n n!}{n^4}$ converges or diverges.